

DOCKET NO: 257542US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :  
JUERGEN SCHROEDER, ET AL. : EXAMINER: EL ARINI, ZEINAB  
SERIAL NO: 10/505,163 :  
FILED: AUGUST 30, 2004 : GROUP ART UNIT: 1746  
FOR: CLEANING OF TRAY COLUMNS :  
WHICH HAVE BEEN USED FOR  
RECTIFICATIVELY TREATING LIQUIDS  
COMPRISING (METH)ACRYLIC ACID  
AND/OR ESTERS THEREOF

APPEAL BRIEF

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313

SIR:

This is an appeal of the Final Rejection dated December 12, 2006 of Claims 1-5 and 7-12. A Notice of Appeal was timely filed on March 12, 2007.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is BASF Aktiengesellschaft, having an address at 67056 Ludwigshafen, Germany.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and the assignee are aware of no appeals, interferences, or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

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### III. STATUS OF THE CLAIMS

Claims 1-5 and 7-12 stand rejected and are herein appealed. Claim 6 has been canceled.

### IV. STATUS OF THE AMENDMENTS

An amendment under 37 CFR 41.33 is **submitted herewith**. The amendment simply corrects a typographical error in Claim 1. (The discussion below assumes entry of this amendment.)

### V. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent Claim 1 is drawn to a process for cleaning tray columns which have been used for rectificatively treating liquids comprising (meth)acrylic acid, esters of (meth)acrylic acid or mixtures of (meth)acrylic acid and esters of (meth)acrylic acid: the process comprising

conveying a basic liquid downward through the tray column, and

passing a gas through the tray column in countercurrent to the basic liquid,

wherein during the cleaning, a difference between a pressure in the gas immediately below a lowermost tray of the tray column and a pressure in the gas immediately above an uppermost tray of the tray column divided by the number of trays in the column is from 0.5 to 5 mbar per tray.

See original Claims 1 and 2, and the specification at page 2, line 41 through page 3, line 8.

## VI. GROUNDS OF REJECTION

Claims 1-5 and 7-12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over WO 01/51159 (Neutzner et al) in combination with US 3,969,094 (Dunson et al) or US 3,958,964 (Koch).

## VII. ARGUMENT

Claims 1-5 and 7-12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Neutzner et al<sup>1</sup> in combination with Dunson et al or Koch. The rejection is untenable and should not be sustained.

As recited in Claim 1, an embodiment of the present invention is a process for cleaning tray columns which have been used for rectificatively treating liquids comprising (meth)acrylic acid, esters of (meth)acrylic acid or mixtures of (meth)acrylic acid and esters of (meth)acrylic acid: the process comprising conveying a basic liquid downward through the tray column, and passing a gas through the tray column in countercurrent to the basic liquid, wherein during the cleaning, a difference between a pressure in the gas immediately below a lowermost tray of the tray column and a pressure in the gas immediately above an uppermost tray of the tray column divided by the number of trays in the column is from 0.5 to 5 mbar per tray.

Applicants have discovered that by operating within the above-recited pressure differential, superior cleaning is obtained which could not have been predicted by the applied prior art.

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<sup>1</sup> Discussion of Neutzner et al in the text is to the English translation of record.

Neutzner et al is drawn to a method for cleaning stripping columns by bringing the inner surfaces of the stripping columns into contact with an aqueous solution of an alkaline compound (sentence bridging pages 5 and 6). Neutzner et al discloses a further embodiment wherein the aqueous alkaline solution flows downward through the column and in order to increase the cleaning effect, a vapor flow can be guided contrary to the downward flowing alkaline solution (page 7, lines 9-21). The vapor may be in the form of steam which also acts to heat the alkaline solution (page 10, line 11ff). Various pressures are disclosed in Neutzner et al, such as the pressure of the steam and pressure in the column during cleaning (page 10, penultimate line through page 11, line 19). However, no pressure differential is disclosed as a parameter in the method of Neutzner et al. Indeed, Neutzner et al suggests that the cleaning process be conducted at a constant pressure (page 11, lines 5-9). Nevertheless, while Neutzner et al does not specifically disclose pressure differentials, the examples of Neutzner et al are carried out at pressure differentials substantially greater than the presently-recited maximum of 5 mbar per tray. This conclusion is arrived at as follows: Example 1 of Neutzner et al describes 10 rainscreens in a column, which correspond to 10 trays. Steam at 4-bars of pressure is used. A pressure gradient across the column of 3-bar (4-bars down to 1-bar), which equals 3000 mbar, divided by 10 rainscreens (trays) equals 300 mbar of pressure per rain screen. Similarly, Example 2 of Neutzner et al employs the same 4-bar steam pressure but uses 20 rainscreens, and thus the pressure gradient across the column is 3000 mbar divided by 20 rainscreens, or 150 mbar of pressure per rainscreen.

In addition, the comparative data of record, both in the specification and submitted by the Declaration under 37 C.F.R. § 1.132 of Volker Diehl (Diehl Declaration), filed November 24, 2006, demonstrates the superiority in cleaning by operating within the presently-recited pressure differential. The Example in the specification, described beginning at page 6, line 4

thereof, operating at a pressure differential of 2 mbar/tray, resulted in a residue after cleaning of <5 kg. The Comparative example, described in the specification at page 7, line 40 through page 8, line 8, which operated at a pressure differential of << 0.5 mbar/tray, resulted in a residue of 80 kg of polymer. When an air feed was then introduced, resulting in a pressure differential of 2.2 mbar/tray, the amount of residue then became <5 kg, as described in the specification at page 8, lines 8-15.

The Diehl Declaration first explained that there is an error in the description of the Example in the specification with regard to the amount of air; however, there is no error in the results. In addition, Diehl repeated the Example of the specification, but varied the amount of air flow rate, in order to obtain a pressure differential of 1 mbar/tray (experiment A) and 10 mbar/tray (experiment B). In experiment A, which is according to the presently-claimed invention, a polymer remainder was less than 5 kg in total. In experiment B, on the other hand, which is outside the terms of the present claims, the polymer remainder was more than 50 kg in total. As Diehl declares: "Above results could not have been foreseen by the skilled artisan and reflects the unobviousness of the invention claimed in [the present application] versus the closest state of the art."

Dunson et al discloses a flue gas scrubber using baffle tray columns and operated to function as a scrubber for the cleaning of flue gases subject to wide variations in flow (Abstract). The Examiner finds that Dunson et al discloses a relationship between pressure difference and number of trays.

Koch discloses a column for bringing gases or vapors and liquids into contact which uses a plurality of plates made from a highly porous, open-pore sintered material, wherein the gas and the liquid are conducted counter-current-wise (Abstract). The Examiner finds that Koch discloses the relation between pressure difference and dimension of a column.

The Examiner holds that the above-recited pressure differential would have been obvious to employ in Neutzner et al “because according to Dunson et al and Koch one skilled in the art would adjust the difference of the pressure to obtain the optimum results and to enhance cleaning process.”

In reply, Applicants respectfully submit that both Dunson et al and Koch are irrelevant herein. Neither Dunson et al nor Koch is concerned with cleaning tray columns which have been used for rectificatively treating liquids of the type recited in the present claims.

In the Final Rejection, the Examiner finds that the Diehl Declaration is ineffective because the specification as originally filed “(also the priority document, page 7, line 46) does not include the 16,000 m<sup>3</sup>/h or 7,500 m<sup>3</sup>/h as disclosed in the declaration.”

In reply, it is well-established that data in a declaration under 37 C.F.R. § 1.132 does not need literal support in the original disclosure. The data is simply being used to demonstrate the significance of the presently-recited pressure differential range.

It is respectfully submitted that the applied prior art does not present a *prima facie* case of obviousness. Particularly, the Examiner has not shown that gas pressure differential in a process for cleaning tray columns which have been used for rectificatively treating liquids and which involve conveying liquid downward through the tray column and gas upward through the column, was a known result-effective variable, let alone such processes where the treated liquids comprise (meth)acrylic acid and/or esters of (meth)acrylic acid and the conveying liquid is a basic liquid. Thus, the present claims are patentable under the rationale of *In re Antonie*, 559 F.2d 618, 195 USPQ 6, 8-9 (CCPA 1977) (exceptions to rule that optimization of a result-effective variable is obvious, such as where the results of

optimizing the variable are unexpectedly good or where the variable was not recognized to be result effective). Applicants are entitled to prevail under either of the above exceptions.

Claim 10

Claim 10 is separately patentable, since Neutzner et al is limited to an aqueous alkaline solution and neither discloses nor suggests the use of basic polar organic solvents.

Claim 11

Claim 11 is separately patentable, since Neutzner et al is limited to an aqueous alkaline solution and thus, neither discloses nor suggests an amine or amide or mixture thereof as basic polar organic solvents.

For all the above reasons, it is respectfully requested that this rejection be REVERSED.

VIII. CONCLUSION

For the above reasons, it is respectfully requested that all rejection be REVERSED.

Respectfully submitted,

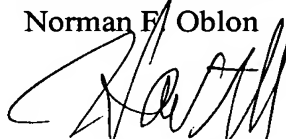
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CLAIMS APPENDIX

Claim 1: A process for cleaning tray columns which have been used for rectificatively treating liquids comprising (meth)acrylic acid, esters of (meth)acrylic acid or mixtures of (meth)acrylic acid and esters of (meth)acrylic acid: the process comprising conveying a basic liquid downward through the tray column, and passing a gas through the tray column in countercurrent to the basic liquid, wherein during the cleaning, a difference between a pressure in the gas immediately below a lowermost tray of the tray column and a pressure in the gas immediately above an uppermost tray of the tray column divided by the number of trays in the column is from 0.5 to 5 mbar per tray per tray.

Claim 2: The process as claimed in claim 1, wherein, during the cleaning, the difference between the pressure in the gas phase immediately above the uppermost tray of the tray column and the pressure in the gas phase immediately below the lowermost tray of the tray column divided by the number of trays in the column is from 1 to 5 mbar per tray.

Claim 3: The process as claimed in claim 1, wherein, during the cleaning, the difference between the pressure in the gas phase immediately above the uppermost tray of the tray column and the pressure in the gas phase immediately below the lowermost tray of the tray column divided by the number of trays in the column is from 2 to 4 mbar per tray.

Claim 4: The process as claimed in claim 1, wherein the basic liquid is an aqueous solution of sodium hydroxide.



Claim 5: The process as claimed in claim 1, wherein the gas passed through the tray column in countercurrent to the basic liquid is air.

Claim 7: The process as claimed in Claim 1, wherein the gas passed through the tray column in countercurrent to the basic liquid is selected from the group consisting of nitrogen, air, air diluted with nitrogen, steam and mixtures thereof.

Claim 8: The process as claimed in Claim 1, wherein the basic liquid is an aqueous solution of at least one selected from the group consisting of alkali metal hydroxide, alkaline earth metal hydroxide, NaOH, KOH and  $\text{Ca}(\text{OH})_2$ .

Claim 9: The process as claimed in Claim 7, wherein a material selected from the group consisting of a substantially pH-neutral alkali metal salt, an alkaline earth metal salt, and a mixture thereof, is added to the basic liquid.

Claim 10: The process as claimed in Claim 1, wherein the basic liquid is a basic polar organic solvent.

Claim 11: The process as claimed in Claim 10, wherein the basic polar organic solvent is an amine, amide or a mixture of amine and amide.

Claim 12: The process as claimed in Claim 7, wherein the basic liquid is utilized at a temperature of from  $>80^\circ\text{C}$  to about  $115^\circ\text{C}$ .

EVIDENCE APPENDIX

Declaration under 37 CFR 1.132 of Volker Diehl, filed November 24, 2006.

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re Application of  
Juergen Schroeder, et al.  
Serial No. 10/505,163  
Filed: August 30, 2004



For: Cleaning of tray columns which have been used for rectificatively treating liquids comprising (meth)acrylic acid and/or esters

D E C L A R A T I O N

I, Volker Diehl, Dr. rer. nat., a citizen of Germany and residing at 67158 Ellerstadt, Portugieserring 43, Germany, declare as follows:

I am a fully trained chemist, having studied chemistry at the University of Saarbrücken, Germany, from 1965 to 1972.

I was awarded my doctor's degree by the University of Saarbrücken, Germany, in 1975.

I joined BASF Aktiengesellschaft of 67056 Ludwigshafen, Germany, in 1977 and have since then preponderantly worked in production of acrylic monomers.

I'm one of the inventors of Ser.No. 10/505,163.

I have carefully read the Official Actions issued by now. In order to prove the superiority of a process for cleaning tray columns which have been used for rectificatively treating liquids comprising (meth)acrylic monomers which cleaning process employs passing a gas through the tray column in countercurrent to a basic liquid at a pressure loss in the gas phase of from 0.5 to 5 mbar per tray, I would like

to make to following statements:

1. On page 7, line 31 of Ser.No. 10/505,163 I have become aware of an obvious error, as the "600 m<sup>3</sup>/h of air at ambient temperature" in said line 31 correctly have to read "16,000 m<sup>3</sup>/h"
2. In addition to the Example and Comparative Example of Ser. No. 10/505,163 the following experiments were carried out under my supervision:

A) The Example of Ser. No. 10/505,163 was repeated under using the same tray column which had an opening ratio of 12.5 %. However over the entire duration of the sodium hydroxide solution flushing, instead of 16,000 m<sup>3</sup>/h only 7,500 m<sup>3</sup>/h of air at ambient temperature was fed to the column below the first tray, which caused an average gas phase differential pressure over all trays of 1 mbar/tray instead of 2mbar/tray. After the end of the flushing inspection of the tray column resulted in a polymer remainder of less than 5 kg in total.

B) The Example of Ser. No. 10/505,163 was repeated under using the same tray column which had an opening ratio of 12.5 %. However over the entire duration of the sodium hydroxide solution flushing, instead of 16,000 m<sup>3</sup>/h 49,500 m<sup>3</sup>/h of air at abient temperature was fed to the column below the first tray, which caused an average gas phase differential pressure of 10 mbar/tray instead of 2 mbar/tray. After the end of the flushing inspection of the tray column resulted in a polymer remainder of more than 50 kg in total.

Through an increase of the average gas phase differential pressure to values above 10 mbar/tray as recommended in WO 01/51159 the aforesaid amount of polymer remainder could not be diminished.

Above results could not have been foreseen by the skilled artisan and reflects the unobviousness of the invention claimed in Ser. No. 10/505,163 versus the

closest state of the art.

The undersigned declares further that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Signed at 67056 Ludwigshafen, Germany, this 9<sup>th</sup> day of November 2006.



Signature of Declarant

Application No. 10/505,163  
Appeal Brief

RELATED PROCEEDINGS APPENDIX

None.